ABSTRACT

This application is directed to novel fluorinated polymers and prepolymers derived from mono-substituted oxetane monomers having fluorinated alkoxymethylene side-chains and the method of making these compositions. The mono-substituted fluorinated oxetane monomers having fluorinated alkoxymethylene side-chains are prepared in high yield by the reaction of a fluorinated alkoxides with either 3-halomethyl-3-methyloxetane premonomers or aryl sulfonate derivative of 3-hydroxymethyl-3-methyloxetane premonomers. Preparation of a mono-substituted 3-bromomethyl-3-methyloxetane premonomer via a simple, high yield process amenable to commercial scaleup is also disclosed. The fluorinated oxetane monomers of this invention can be readily homo/co-polymerized in the presence of a Lewis acid and polyhydroxy compounds to obtain hydroxy-terminated polyether prepolymers having fluorinated alkoxymethylene side chains. Additionally, the fluorinated oxetane monomers can be copolymerized with non-fluorinated monomers such as tetrahydrofuran to give polyether prepolymers with improved hydrocarbon compatibility. These prepolymers are polydisperse and exhibit number average molecular weights from 5,000 to about 50,000. These prepolymers are amorphous oils with primary hydroxy end-groups and thus function efficiently as the soft block for the synthesis of a variety of thermoset/thermoplastic elastomers and plastics having the characteristics of very low surface energy, high hydrophobicity, low glasss transition temperature and low coefficient of friction. The polyurethanes derived from the prepolymers of this invention are elastomeric and, in addition to the above characteristics, exhibit high moisture resistance, high tear strength and excellent adhesion to a variety of substrates.